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Spring and Fall Thermal Transition Dates Continue to Shift; Sea Surface Temperatures Remain Warm as Bottom Waters in Mid-Atlantic Region Cool During First Half of 2014

Spring and fall thermal transition dates, based on a benchmark of average temperature between winter and summer, continue to shift, according to the latest Ecosystem Advisory from NOAA's Northeast Fisheries Science Center (NEFSC).

In 2014, the spring transition date was among the earliest dates recorded during the past three decades. Projections to the year 2100 suggest a shift of three to four weeks in the transition date, which is an indicator of the arrival of spring. Coupled with the expectation of a later arrival of fall, the earlier arrival of spring will result in lengthening the summer portion of the year by approximately two months.

"The spring transition date, currently identified as mid-May is likely to shift to early April, and the fall transition, currently identified as mid-November, will likely shift well into December," said Kevin Friedland, an oceanographer with the Center's Ecosystem Assessment Program. "This implies that the summer portion of the year, based on the transition temperatures, will increase by nearly two months to about 240 days. The extended summer period will have a significant impact on the living marine resources on the shelf. Organisms living in the Northeast Shelf ecosystem will have to deal with the challenges of a longer summer and competition from warm tolerant species entering their habitats."

The advisory also reported that the composite spring plankton bloom on the Northeast Shelf system was early and short-lived. "Some regions of the ecosystem have a well-developed spring phytoplankton bloom, but the bloom in the Gulf of Maine was poorly developed and below normal detection limits," Friedland said. "Phytoplankton production during the year is essential to the health of the ecosystem. The bloom is a critical source of nutrition for the early life history stages of many species."

During the first half of 2014, sea surface temperatures in the Northeast Shelf Large Marine Ecosystem continued to moderate compared to the record high remperatures in 2012 but still remain above average, according to the latest advisory. The moderating effect was not uniform across the ecosystem, as surface and bottom waters in the northern regions of the Gulf of

Maine and Georges Bank remained relatively warm, while bottom waters south of Cape Cod and Rhode Island into the Mid Atlantic Bight were cooler and closer to average.

Given the interest in shifting ocean temperatures, two new features have now been added to the Ecosystem Advisory. Species distribution trends and kernel density plots illustrate how the distribution of 48 fish and invertebrate species sampled by the NEFCS's annual spring and autumn bottom trawl surveys have changed over time.

The species distribution trends show how each species has shifted in recent decades along the shelf from southwest to northeast and from the coastline to offshore waters. The kernel density plots compare distribution of each species from the1970s to the current time period represented by the last three years of the survey. Among the most dramatic distribution shifts are those for American lobster, black sea bass, blueback herring, cunner, and sand lance.

Ecosystem Advisories have been published twice each year since 2006 as a way to routinely summarize overall conditions in the region. The reports show the effects of changing coastal and ocean temperatures on fisheries from Cape Hatteras to the Canadian border. The advisories provide a snapshot of the ecosystem for a broad range of stakeholders including fishery managers, fishermen, researchers and the interested public.

To view the spring 2014 summary of conditions for the Northeast U.S. Shelf and related background data, go to the Ecosystem Advisory (http://www.nefsc.noaa.gov/ecosys/advisory/current/index.html)

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Related links:

2013 Ecosystem Advisory: http://www.nefsc.noaa.gov/press_release/pr2014/scispot/ss1404/

Ecosystem Advisory Archives: http://www.nefsc.noaa.gov/ecosys/advisory/archives.html

Ecosystem Assessment Program: http://www.nefsc.noaa.gov/ecosys/